THE AUSTRIAN METEOROLOGICAL SERVICE.

The following letter was recently received at the central office of the United States Weather Bureau:

[Translation.]

ZENTRALANSTALT FÜR METEOROLOGIE AND GEODYNAMIK, WIEN XIX. HOHE WARTE 38.

WIEN, am 2. *Dezember, 1920.*

The Zentralanstalt für Meteorologie und Geodyn amik in Vienna is one of the oldest meteorological institutions in the world. Upon the suggestion of the Vienna Academy of Sciences it was founded in the year 1851 by the Austrian State to cultivate meteorology and terrestrial magnetism, and has served science as well as practical life for 70 years.

The results of the war and the subsequent peace now place its further activities in question. The impoverished little Austrian Republic lacks the means which are requisite for carrying on the work of the Zentralanstalt.

The undersigned, the former and the present director of this old institution, feel bound to notify the meteorological institutes, societies, and scientists of the world, which stand in relation, on account of scientific or practical interests, with the Zentralanstalt in Vienna and exchange publications with it, of the urgent distress of the institution.

They proceed for that purpose on the supposition that a scientific institution like the Zentralanstalt is, to a certain degree, the property of all cultivated nations of the world, and all are interested in its existence.

The undersigned, in view of these considerations, are making a plea for funds with which to maintain the Zentralanstalt. The low value of the Austrian crown (a little less than 2 Swiss centimes) makes it on the one hand, easy for foreign countries to help, but on the other hand, makes the endowment, provided by our own State, although it has been increased, seem more and more inadequate.

From now on it is impossible for the Zentralanstalt to publish its yearbooks, even for diminished Austria, although the yearly expenses of printing to-day amount to only 1,000 Swiss francs. The yearbook on account of the results of observations, and other information which they contain, furnish the basis for the development of our science.

In other respects, also, the Zentralanstalt can not possibly maintain its work. The purchase of instruments has become impossible, the hydrogen for pilot balloons, and the rubber balloons for sounding-balloon ascents, are too dear; also the library can not be supplied, as the smallest foreign books or journals cost hundreds of crowns. Consequently the foreign works on meteorology can not be studied and we remain behind the times. The weather map can still be issued a half-year longer, until the stock of paper is exhausted, then that must also cease. The earthquake station in Vienna is still maintained with difficulty, the stations in Graz and Innsbruck must, on the contrary, be discontinued, as the expenses are too great. It is out of the question to resume the observations in terrestrial magnetism which before the war were registered at the high station on the Obir. Wherever one looks, everywhere there prevails the same wretched collapse of our work.

The undersigned refrain from mentioning the rôle which the Austrian school of meteorology has played in the last 50 years. They permit themselves only to name some books which have been issued from the Vienna Zentralanstalt:

Meteorologische Zeitschrift, since 1866; J. Hann, Handbuch der Klimatologie; J. Hann, Lehrbuch der Meteorologie; J. M. Pernter, Meteorologische Optik; W. Trabert, Lehrbuch der kosmischen Physik; F. M. Exner, Dynamische Meteorologie.

May our foreign colleagues be reminded by these book titles of the Zentralanstalt für Meteorologie in Vienna, and assist in its preservation.

Most respectfully,

F. M. EXNER,
The Present Director.
J. HANN,
The Former Director.

SYSTEMATIC PHOTOGRAPHY OF THE AURORA.

[Reprinted from *Scientific American*, New York, Jan. 15, 1921, p. 43.]

The work of Prof. Carl Störmer, in Norway, in making simultaneous photographs of the aurora at two or more stations in order to determine its exact altitude and position in space has now developed to such an extent that, during the remarkable display of March 22–23, 1920, seven stations connected by telephone were in operation: viz, Bygdo (Störmer's home), Oscarsborg, Horten, Christiania, Konigsberg, Fredrikashald, and Dombaas. The distances between stations range from 26 to 80 kilometers. During the years 1911–1920 the stations at Christiania and Bygdo have made more than 300 successful pairs of simultaneous pictures, besides about 200 single pictures. Many fine photographs—single, double, and triple—were secured of the aurora above mentioned. Several single photographs were made of some wonderful blue rays, which formed a "corona" of dazzling brilliancy, and which were so intense that they were photographed, with an exposure of less than a second, after the dawn had so far advanced that first-magnitude stars were barely visible. Prof. Störmer reports that preliminary measurements of his photogrammetric pictures indicate, for the upper limit of the auroral rays in the recent display, an altitude of the order of 500 kilometers (310 miles). No aurora had previously been photographed above about 300 kilometers (186 miles).

REPORT ON THE ASTROPHYSICAL OBSERVATORY FOR THE YEAR ENDING JUNE 30, 1920.

By C. G. ABBOT, Director.

[Reprinted from the Smithsonian Report for 1920, pp. 90–95.]

Seldom is so much of scientific interest included in six pages of an annual report as is to be found in the above. For example, there is a paragraph on "Agreement of Mount Wilson and Chilean Work," and another on "Solar variation confirmed by observations of Saturn." In the discussion of this latter, two hypotheses are advanced relative to the nature of solar variation: (1) "The sun might vary in such a manner that its changes would be observed simultaneously in all directions and so would occur on identical days on all the planets." (2) "On the other hand, the solar radiation may be unequal in different directions."

These irregularities are attributed to unequal absorption or scattering of the rays in the coronal regions near the sun. Or to state it in another way, clouds that absorb or diffuse the solar rays by varying amounts are continually passing in the coronal regions between us and the radiating surface of the sun. The latter may therefore alternately present to us a surface that is relatively clear and hot or clouded and cool. It is only by accepting this second hypothesis that the variations observed in the solar constant and in the brightness of Saturn can be made to synchronize.

It is a matter of regret that volume IV of the Annals of the Observatory, which contains details of what is here merely mentioned, awaits the appropriation of funds for its publication.

There is also reference to "The honeycomb pyranometer," an instrument of the black-body type, for measuring the so-called "nocturnal radiation," and to experiments on the constant of radiation, "sigma."

Finally, the steps are narrated that have made it possible to move the Chilean observing station from a plain near Calama to a near-by mountain site, and to establish a new observatory in the Harqua Hala Mountains, near Wenden, Ariz. Again it is a matter of regret that insufficient funds render the maintenance of these two important observations possible only at great personal sacrifice on the part of Dr. Abbot and his assistants, sacrifices that few are willing to make except under the stimulus of anticipated important achievements.

Dr. Abbot's summary of his report follows:

The year has been marked by the practical completion for publication of Volume IV of the Annals, but no appropriation is yet available for its publication. Close agreement of solar variation was found for 1918 and 1919 between results of Mount Wilson, Calif., and Calama, Chile, 4,000 miles apart. A further remarkable confirmation of the solar variation comes from a comparison of Smithsonian observations in Chile with photoelectric observations of the brightness of Saturn by Dr. Guthnick, of the Berlin-Babelsberg Observatory. This comparison indicates that the nature of the rapid solar variation consists in the rotation with the sun of rays of unequal brightness which strike the different planets successively in the order of their longitudes and fall one after the other upon the earth as the sun by rotation brings them into line with us. A new nocturnal radiation instrument, provisionally called the "honeycomb pyranometer" on account of its cellular structure, and which employs the well-known hollow chamber principle of the "absolutely black" body, but without loss of sensitiveness, has been successfully constructed and tried. By the generosity of Mr. John A. Roebling, of New Jersey, it has been possible to remove the Chile station to a mountain above the dust and smoke of its former plateau location, and also to erect a building on the Harqua Hala Mountain, in Arizona, to which the Mount Wilson solar-constant work will be removed in September, 1920.—*H. H. K.*

DEGREE OF TEMPERATURE TO WHICH SOILS CAN BE COOLED WITHOUT FREEZING.

By GEORGE BOUYOUCOS.

[Abstracted from *Journal of Agricultural Research*, Nov. 15, 1920, Vol. XX, No. 4, pp. 267-269.]

Careful tests showed that soil will not freeze at a temperature of −1° C. (30.2° F.) unless it is vigorously agitated. If not disturbed, it will remain at this temperature indefinitely without freezing.

Dr. Bouyoucos found further that, if not disturbed, sand, loam, and clay soils may be cooled to −4.2° C. (24.4° F.), and peat and muck to −5° C. (23° F.) without freezing. The moisture content of the soils had no influence on the possible extent of supercooling.

This explains why the soil need not be frozen even though the temperature of the air and of the soil itself may be considerably below 32° F.

The author points out that by the method now in vogue for measuring the temperature of soils during cold weather the thermometer may give a record several degrees below the freezing point and yet the soils may not be actually frozen.

"Indeed," he says, "the ability of soils to resist freezing even when their temperature is much below the freezing point throws considerable new light on questions regarding the temperature of soils in cold seasons and consequently upon the physical, chemical, and bacteriological processes going on in the soils during those seasons."—*J. Warren Smith.*

CLIMATE OF NEW ZEALAND.[1]

By Lieut. Col. D. C. BATES, Dominion Meteorologist.

[Review.]

This useful book[2] gives averages of temperatures, rainfall, and, in some cases, sunshine, for 11 stations in New Zealand, ranging from Auckland in the north, with a superb subtropical climate, to Invercargill in the south with the climate of southwest England. The climatic features of each district are succinctly described, but we miss the generalized account of the meteorology of the region which would bind the sections together and enable the reader to see how far the local characteristics are subservient to the prevailing winds and other far-reaching causes.

[1] Reprinted from *The Meteorological Magazine*, London, December, 1920, p. 257.)
[2] Prepared for publication in the *New Zealand Official Year-Book*.

INFLUENCE OF TEMPERATURE AND HUMIDITY ON THE GROWTH OF PSEUDOMONAS CITRI AND ITS HOST PLANTS AND ON INFECTION AND DEVELOPMENT OF THE DISEASE.

By GEORGE L. PELTIER.

[Abstracted from *Journal of Agricultural Research*, Dec. 15, 1920, Vol. XX, No. 6, pp. 447-506.]

This is a complete and valuable study, not only of the effect of temperature and humidity on the development of citrus diseases, but on the growth and development of the different citrus trees.

Two types of rest periods are discussed: Winter dormancy, brought about by the approach of cold weather when cell activity ceases to a great extent, and the short rest periods which occur during the growing season when some of the cell functions merely slow up.

With the time factor included, the optimum temperature for citrus plants lies between 20° and 30° C. (68° and 86° F.).

Three conditions are essential for disease infection—the presence of free moisture on the plant, a suitable temperature, and an actively growing plant.

The conditions for the most rapid development of citrus diseases are also those that are most favorable for the growth of the host plants.

This study, with another that Dr. Peltier is now making on the relations of climate to citrus canker and scab, will make a valuable addition to our at present rather incomplete knowledge of the effect of climate and weather on plant diseases.—*J. Warren Smith.*

CITRUS FRUIT FUMIGATION SAFEST IN DARK AND AT MODERATE TEMPERATURES.

While it has long been known that the presence of light during fumigation of citrus fruit with hydrocyanic acid is one of the factors which causes injury to both fruit and foliage, it has not been known that light before and after fumigation has a similar effect. This fact has been disclosed by recent tests conducted in California by specialists of the United States Department of Agriculture, who have made a report of the experiments with suggestions for preventing injury, in department Bulletin 907, "Fumigation of Citrus Plants with Hydrocyanic Acid: Conditions Influencing Injury."

Moisture and temperature, as well as light, influence fumigation injury, and experiments show that fumigation is more safely performed at temperatures below 80° F. Sudden changes of temperature over a wide range during exposure tend greatly to increase plant injury. Trees in wet soil are likely to be more severely injured than healthy trees in dry soil.